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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,572	07/21/2004	XIAOGUO TANG	81105976	4571
46535	7590	12/29/2005	EXAMINER	
BIR LAW, PLC/FGTL 45094 MIDDLEBURY COURT CANTON, MI 48188-3215			TRAN, BINH Q	
			ART UNIT	PAPER NUMBER
			3748	

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/710,572		TANG ET AL.	
	Examiner		Art Unit	
	BINH Q. TRAN		3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-6 and 14-26 is/are allowed.
- 6) ☒ Claim(s) 7-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the amendment filed October 07, 2005.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 7-9, and 11-13 are rejected under 35 U.S.C. 102 (e) as being anticipated by Collier, Jr. (Collier) (Patent Number 6,405,720 B1).

Regarding claim 7, Collier discloses a method for operating a hydrogen fueled spark ignition engine having an associated lean NOx trap, the method comprising: operating the engine at a lean air/fuel ratio with a first level of residual exhaust gases; determining when to purge the associated lean NOx trap; and enriching the air/fuel ratio and increasing the residual exhaust gases to avoid auto ignition while purging the NOx trap in response to a purge determination (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

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Regarding claim 8, Collier further discloses the step of enriching the air/fuel ratio comprises reducing the air/fuel ratio to about a stoichiometric air/fuel ratio (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

Regarding claim 9, Collier further discloses the step of enriching the air/fuel ratio comprises reducing the air/fuel ratio to a ratio rich of stoichiometry (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

Regarding claim 11, Collier further discloses the residual exhaust gases comprise exhaust gas recirculation and exhaust gas trapped in a combustion chamber from a previous combustion event (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

Regarding claim 12, Collier further discloses the step of enriching the air/fuel ratio and increasing the residual exhaust gases comprises increasing the residual exhaust gases to about 40-40% of the mass of air and fuel (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

Regarding claim 13, Collier further discloses the engine is a port fuel injected internal combustion engine (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Collier in view of design choice.

Regarding claim 10, Collier discloses all the claimed limitation as discussed above except the engine is operating at an equivalence ratio of between about 0.15 to 0.65.

Regarding the specific range of the equivalence ratio of the engine, it is the examiner's position that the equivalence ratio of about 0.15 to 0.65, would have been an obvious matter of design choice well within the level of ordinary skill in the art, depending on variables such as the size of the engine, as well as mass flow rate of the exhaust gas, the engine operation conditions, the properties of materials for making the catalytic converter, and the controlled temperature of the catalytic converter. Moreover, there is nothing in the record which establishes that the claimed parameters present a novel or unexpected result (See *In re Kuhle*, 562 F. 2d 553, 188 USPQ 7 (CCPA 1975)).

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. In *re Dreyfus*, 22 CCPA (Patents) 830, 73 F.2d 931, 24 USPQ 52; In *re Waite et al.*, 35 CCPA (Patents) 1117, 168 F.2d 104, 77 USPQ 586. Such ranges are termed "critical" ranges, and the applicant has the burden of proving such criticality. In *re Swenson et al.*, 30 CCPA (Patents) 809, 132 F.2d 1020, 56 USPQ 372; In *re Scherl*, 33 CCPA (Patents) 1193, 156 F.2d 72, 70 USPQ 204. However, even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. In *re Sola*, 22 CCPA (Patents) 1313, 77 F.2d 627, 25 USPQ 433; In *re Normann et al.*, 32 CCPA (Patents) 1248, 150 F.2d 627, 66 USPQ 308; In *re Irmischer*, 32 CCPA (Patents) 1259, 150 F.2d 705, 66 USPQ 314. More particularly, where the general conditions of a claim are disclosed in the prior art, it is not

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inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al. v. Coe, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

Response to Arguments

Applicant's arguments filed October 07, 2005 have been fully considered but they are not completely persuasive. ***Claims 1-26 are pending.***

Applicant's cooperation in explaining the claims subject matter more specific to overcome the claim rejection is also appreciated.

Applicants have argued that Collier, Jr. does not teach or suggest Applicants's claimed invention. More specifically, Applicants assert that the reference to Collier fails to teach "*a catalytic converter as a lean NOx trap*"; and "*the engine is intended to run on hydrogen and is accordingly called a "Hydrogen Fueled Spark Ignition Engine"*",

In response to applicant's arguments, the recitation of "*the engine is intended to run on hydrogen and is accordingly called a "Hydrogen Fueled Spark Ignition Engine"*" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Moreover, Applicants assert that the reference to Collier fails to teach “*a catalytic converter as a lean NOx trap*”. The examiner respectfully disagrees, the patent to Collier discloses “*a method of producing near zero NOx and near zero CO emissions in exhaust gas of from an internal combustion engine using gaseous fuel comprised of natural gas and at least one additional gas selected from hydrogen and carbon monoxide*”. In column 6, lines 17-56, Collier has disclosed that “For purposes of operating the internal combustion engine under conditions that produce near zero carbon monoxide in the exhaust discharged, the engine is operated at air and gaseous fuel equivalence ratios, Φ , in the range of 0.99 to 0.7, with preferred ratios being in the range of 0.95 to 0.8. For purposes of operating the internal combustion engine under conditions that produce near-zero NOx in the exhaust discharge, the engine is operated at air plus recirculated exhaust to gaseous fuel equivalence ratios, Φ , in the range of 0.6 to 0.45, with the preferred ratios being in the range of 0.58 to 0.52. By near-zero NOx is meant that less than 10 ppm NOx is present in the exhaust gas emitted from the internal combustion engine. By near-zero CO is meant that less than 10 ppm carbon monoxide is present in the exhaust gas discharged to the atmosphere. In accordance with the present invention, 30 to 50 vol. % of the exhaust gas emitted from internal combustion engine 2 is recirculated and added to the gaseous fuel/air mixture for purposes of dilution of the mixture for purposes of providing near-zero NOx in the exhaust gases. As noted, the second portion of the exhaust gas to be discharged to the atmosphere is first forwarded along line 12 for treatment in catalytic reactor 14. Reactor 14 oxidizes the carbon monoxide in the exhaust to carbon dioxide by use of the excess oxygen resulting from the lean burn. Accordingly, carbon monoxide is converted to carbon dioxide before the second portion of the exhaust gas is discharged to the atmosphere. Catalytic reactor 14 can be comprised of a bed of particles or extruded parallel

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channels. *The base material for the particles and the channels can be any suitable refractory such as alumina or cordierite. The catalyst is coated on the base material and can comprise platinum, palladium, rhodium or a mixture thereof*. Typically, the amount of carbon monoxide entering reactor 14 is less than 1000 ppm and typically the amount leaving the reactor is less than 5 ppm. Further, the operating temperature of the reactor is typically greater than 300 °C “. It is well understood in the art that “*The base material for the particles and the channels can be any suitable refractory such as alumina or cordierite. The catalyst is coated on the base material and can comprise platinum, palladium, rhodium or a mixture thereof*” is *also trap NOx in the exhaust gas of the internal combustion engine.*

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Allowable Subject Matter

Claims 1-6, and 14-26 are allowed.

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Since allowable subject matter has been indicated, applicant is encouraged to submit formal drawings in response to this Office action. The early submission of formal drawings will permit the Office to review the drawings for acceptability and to resolve any informalities remaining therein before the application is passed to issue. This will avoid possible delays in the issue process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Binh Tran whose telephone number is (571) 272-4865. The examiner can normally be reached on Monday-Friday from 8:00 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reach on (571) 272-4859. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BT
December 24, 2005



Binh Q. Tran
Patent Examiner
Art Unit 3748